We claim:

1. An analyzer for analyzing electrically charged particles comprising:

a) a collimator having an external end and an internal end for receiving a flow of bath gas and a stream of electrically charged particles, wherein the stream of electrically charged particles exit the external end of the collimator having a momentum substantially directed along a charged particle detection axis;

b) an inductive detector in fluid communication with said collimator and located a selected distance downstream of the collimator along the charged particle detection axis with respect to the flow of bath gas; and

c) an electrically charged particle detector in fluid communication with said inductive detector and located a selected distance downstream of the inductive detector along the charged particle detection axis with respect to the flow of bath gas;

wherein said inductive detector is positioned sufficiently close to the detection axis such that the electric field of the charged particles induce electric charges on the surface of the inductive detector.

2. The analyzer of claim 1 wherein the collimator is an aerodynamic ion lens system of selected length having an optical axis coaxial with the detection axis, said aerodynamic ion lens system having an internal end and an external end, wherein electrically charged particles and a flow of bath gas enter the internal end and the flow of bath gas through the lens system focuses the spatial distribution of the electrically charged particles about the detection axis and wherein the electrically charged particles exit the external end of the

aerodynamic ion lens system having a momentum substantially directed along the detection axis.

3. The analyzer of claim 2 wherein the aerodynamic ion lens system comprises a plurality of apertures positioned at selected distances from the electrically charged droplet source along the detection axis, wherein each aperture is concentrically positioned about the detection axis.

4. The analyzer of claim 3 wherein the apertures are substantially circular.

5. The analyzer of claim 4 wherein the diameters of the plurality of apertures decrease sequentially from the internal end to the external end of the aerodynamic ion lens system.

6. The analyzer of claim 3 wherein the spacing between the plurality of apertures is selectively adjustable.

7. The analyzer of claim 2 wherein the aerodynamic ion lens system further comprises a thin plate orifice nozzle operationally connected to the external end of the aerodynamic ion lens system.

8. The analyzer of claim 2 wherein the aerodynamic ion lens system is substantially free of electric fields, electromagnetic fields or both generated by sources other than the charged particles.

9. The analyzer of claim 2 wherein the flow of bath gas through said aerodynamic ion lens system is a laminar flow.

10. The analyzer of claim 2 wherein the flow rate of gas through the aerodynamic ion lens system ranges from about 100 m/sec. to about 500 m/sec.

11. The analyzer of claim 2 wherein the aerodynamic ion lens system is differentially pumped.

12. The analyzer of claim 11 wherein the pressure in the aerodynamic ion lens system ranges from about 5 Torr to about 0.01 Torr.

13. The analyzer of claim 1 wherein the inductive detector comprises a sensing electrode having an axial bore concentrically positioned about the detection axis, wherein the sensing electrode has an external end and an internal end.

14. The analyzer of claim 13 wherein the sensing electrode is substantially tubular in shape.

15. The analyzer of claim 13 wherein the axial bore has a diameter selected from the range of about 0.5 mm to about 5 mm.

16. The analyzer of claim 13 wherein the sensing electrode extends a selected length which is less than about 5 mm along the detection axis.

17. The analyzer of claim 13 further comprising a converter circuit, wherein induced electric charge temporal profiles are obtained as the electrically charged particles pass by the sensing electrode.

18. The analyzer of claim 17 wherein the induced electric charge temporal profiles provide a measurement of the velocity of electrically charged particles or packets of electrically charged particles.

19. The analyzer of claim 13 wherein the sensing electrode is copper.

20. The analyzer of claim 13 further comprising a first shielding element positioned a selected distance upstream of the sensing electrode with respect to the flow of bath gas

having an first axial bore and a second shielding element positioned downstream of the sensing electrode with respect to the flow of bath gas having a second axial bore, wherein the first and second axial bores are concentrically positioned about the detection axis.

21. The analyzer of claim 20 wherein the first and second shielding elements are held at an electric potential substantially close to ground.

22. The analyzer of claim 20 wherein the first and second shielding elements are substantially cylindrical in shape.

23. The analyzer of claim 13 further comprising a shielding element having an axial bore, wherein the sensing electrode is positioned within the axial bore of the shielding element.

24. The analyzer of claim 23 wherein the shielding element extends along the detection axis about 2 mm from the internal end and the external end of sensing electrode.

25. The analyzer of claim 1 wherein the electrically charged particle detector is an inductive detector positioned close enough to the detection axis such that the electric fields associated with the electrically charged particles induce electric charges on the surface of the second inductive detectors.

26. The analyzer of claim 1 wherein the electrically charged particles are gas phase analyte ions.

27. The analyzer of claim 1 wherein the electrically charged particles are packets of gas phase analyte ions.

28. The analyzer of claim 1 wherein the velocities of charged particles are measured.

29. An analyzer for analyzing electrically charged particles comprising:

a) a collimator having an external end and an internal end for receiving a flow of bath gas and a stream of electrically charged particles, wherein the stream of electrically charged particles exits the external end of the collimator having a momentum substantially directed along a charged particle detection axis;

b) a first inductive detector in fluid communication with said collimator and located a selected distance downstream of the collimator along the charged particle detection axis with respect to the flow of bath gas;

c) an accelerator positioned along the detection axis a selected distance downstream from the first inductive detector, wherein the accelerator generates an extraction pulse that accelerates the electrically charged particles to achieve a selected kinetic energy;

d) a second inductive detector in fluid communication with said accelerator and located a selected distance downstream of the accelerator; and

e) a third inductive detector in fluid communication with the second inductive detector and located a selected distance downstream of the second inductive detector;

wherein said first, second and third inductive detectors are positioned close enough to the detection axis such that the electric fields of the charged particles induce electric charges on the surface of the first, second and third inductive detectors.

30. The analyzer of claim 29 wherein the mass-to-charge ratios of charged particles are measured.

31. The analyzer of claim 29 wherein the first inductive detector measures the velocities of the charged particles.

32. The analyzer of claim 29 wherein the first inductive detector is configured to trigger the extraction pulse from the accelerator.

33. The analyzer of claim 29 wherein the inductive charges generated on the second and third inductive detectors measure the start time and end times, respectively, in a time-of-flight measurement.

34. The analyzer of claim 29 further comprising additional inductive detectors located selected distances downstream of the first inductive detector with respect to the flow of bath gas and positioned close enough to the detection axis such that the electric field associate with the electrically charged particles induce electric charges on the surface of the additional inductive detectors.

35. The analyzer of claim 34 comprising about 20 additional inductive detectors.

36. The analyzer of claim 29 wherein the stream of electrically charged particles comprises a stream of spatially separated charged, single particles.

37. The analyzer of claim 29 wherein the stream of electrically charged particles comprises a stream of spatially separated packets of electrically charged particles.

38. A mass spectrometer comprising:

a) a electrically charged particle source for generating a stream of electrically charged particles having a first spatial distribution in a flow of bath gas,

b) a collimator having an external end and an internal end for receiving a flow of bath gas and a stream of electrically charged particles, wherein the stream of electrically charged particles exits the external end of the collimator having a momentum substantially directed along a charged particle detection axis;

c) an accelerator positioned along the detection axis a selected distance downstream from the first inductive detector, wherein the accelerator generates an extraction pulse that accelerates the electrically charged particles to achieve a selected kinetic energy;

d) a first inductive detector in fluid communication with said accelerator and located a selected distance downstream of the accelerator;

e) a second inductive detector in fluid communication with the first inductive detector and located a selected distance downstream of the second inductive detector; and

f) at least one flow inlet, in fluid communication with said collimator for introducing the flow of bath gas;

wherein said first and second inductive detectors are positioned close enough to the detection axis such that the electric fields of the charged particles induce electric charges on the surface of the first and second inductive detectors.

39. The mass spectrometer of claim 38 further comprising a third inductive detector located between the collimator and the accelerator, wherein the third inductive detector is positioned close enough to the detection axis such that the electric fields of the charged particles induce electric charges on the surface of the third inductive detector.

40. The mass spectrometer of claim 38 wherein the electrically charged particle source is an electrospray ionization ion source.

41. The mass spectrometer of claim 38 wherein the electrically charged particle source is a matrix assisted laser desorption and ionization ion source.

42. A method of signal averaging using the analyzer of claim 1 wherein additional inductive detectors are positioned between the first inductive detector and the second charged particle detector, wherein the additional inductive detectors are located close enough to the detection axis such that the electric fields of the charged particles induce electric charges on the surface of the additional inductive detectors.

43. The analyzer of claim 1 wherein said collimator comprises one or more apertures.

44. The analyzer of claim 1 wherein said collimator comprises on or more electrostatic or electrodynamic ion lenses.

45. A fully shielded inductive detector comprising:

a sensing electrode having an axial bore concentrically positioned about a detection axis, wherein the sensing electrode has an external end and an internal end; and

a shielding element having an axial bore concentrically positioned about the detection axis, wherein said shielding element is positioned such that said sensing electrode is within said second axial bore and wherein said shielding element entirely surrounds said sensing electrode.

46. The detector of claim 45 further comprising an insulator positioned between said sensing electrode and said shielding element.

47. The detector of claim 45, wherein said shielding element comprises a tubular shielding body, a first shielding grid and a second shielding grid, wherein said shielding body has said axial bore concentrically positioned about the detection axis, wherein said shielding body has a first end and a second end, wherein said first shielding grid is operationally connected to said first end, and wherein said second shielding grid is operationally connected to said second end.

48. The detector of claim 47 wherein said shielding element further comprises a first endplate operationally connected to said first end and a second endplate operationally connected to said second end.

49. The detector of claim 45 wherein said shielding element is held at an electric potential substantially close to ground.

50. The detector of claim 47, wherein said first shielding grid is positioned a distance from said internal end of said sensing electrode selected from the range of values equal to about 5 mm to about 0.5 mm and said second shielding grid is positioned a distance from said external end of said sensing electrode selected from the range of values equal to about 5 mm to about 0.5 mm.

51. The detector of claim 50, wherein said first shielding grid is positioned 2.5 mm from said internal end of said sensing electrode and said second shielding grid is positioned 2.5 mm from said external end of said sensing electrode.

52. The detector of claim 47 wherein said first shielding grid and said second shielding grid intersect said charge detection axis.